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RADIATION LABORATORY
SAN FRANCISCO NAVAL SHIPYARD
SAN FRANCISCO, 24, CALIFORNIA

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(136)

APR 8 1947

From: Commander, San Francisco Naval Shipyard
To: Chief of the Bureau of Ships (Code 400-689)
Chief of the Bureau of Medicine and Surgery
(Atomic Energy Group)
Attn: Rear Admiral C. J. Brown, (MC) USN

Subj: Monthly Progress Report of Radiation Laboratory for Period
Ending 31 March 1947; transmittal of

Ref: (a) BuShips-Buked SECRET ltr file S(99) Serial 005800 to
Commander, San Francisco Naval Shipyard dtd 18 Feb 1947.

Encls: (A) Progress Report, Radiation Laboratory, for Period Ending
(H.W.) 31 March 1947, ADMINISTRATIVE.
(B) Progress Report, Radiation Laboratory, for Period Ending
31 March 1947, TECHNICAL.

1. Enclosures (A) and (B) comprising the first of the subject reports,
are forwarded in compliance with reference (a).

PHILIP LEHLER

R. G. PRESTON
By direction

CC: 100
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MEDICAL SECTION
RADIATION LABORATORY
SAN FRANCISCO NAVAL SHIPYARD
SAN FRANCISCO, 24, CALIFORNIA

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(136)

Enc. (A)

31 March, 1947.

PROGRESS REPORT

The first Radiological equipment available to the Radiation Laboratory consisted of laboratory type scalars, rate meters and graphic recorders. These instruments had been used at Bikini and were for the most part in poor condition after use and transportation damage in returning to San Francisco.

While little of this equipment was accurate enough for precise laboratory work even when new, it provided valuable training experience to those who were later to become professional, technical and maintenance personnel for the laboratory.

A. Prior to the establishment of present laboratory facilities, the following projects were accomplished:

1. Repair and adjustment of Scalars.

All scalars were carefully checked, repaired and restored to as good a physical and electronic operating condition as possible. It was found that the one University of Chicago Metallurgical Laboratory Beta scalar could be used for precise counting while none of the Victoreen X 327 Beta scalars ~~was~~ became entirely reliable.

2. G-M Tube Threshold and Plateau Curves.

Plateau curves were run on eight Victoreen V-G Series mica window G-M tubes. This detail provided valuable experience in counting techniques to all personnel. All good tubes had average threshold of 1200 Volts, a plateau length of approximately 200 volts and a plateau slope of 0.2%-0.4% per volt. When enclosed in a two inch lead shield the background count averaged 20 Per minute for most tubes. These tubes seem to be excellent for Beta counting.

3. New Quenching Circuit for Victoreen X 327 Scalars.

The quenching circuits associated with the Victoreen X 327 scalars employed two tubes, one of which was a VX-33. The other tube was a 3-A-5 dual tube, only half being functional. The function of the VX-33 was transferred to the unused half of the 3-A-5 with the elimination of the erratic behavior caused by the VX-33. All quenching units were so modified and continue to work entirely satisfactorily.

4. Elimination of Photo-electric effect in the 263 and the X 263 portable survey meters.

Early glass wall Geiger tubes supplied for 263 and the X263 survey meters were supplied without a black laquer coating as a light shield. These tubes most generally showed a high reading when exposed to light. This photo-electric effect did not occur as frequently with the later series black coated tubes. However, too frequently, pin holes occurred in the new black coated tubes and when the black covering pigment was accidentally chipped or scratched in handling.

Since this condition gave considerable trouble to monitors, a laboratory study was conducted to find a suitable light shield that did not absorb beta energies detectable by the 263 and X 263 instruments. This resulted in finding a black light opaque paper which absorbed no beta energies that could be detected by the X 263. This paper is now used on all Geiger tubes whether previously black coated or not.

5. Test Circuit for Microphonics in VX-33 Tubes.

The problem of determining and standardizing the degree of microphonics tolerable in the VX-33 tubes used in the V-1 position of an X-263 has always been laboriously determined by soldering the tube in place in the instrument and checking for proper operation in normal conditions of use. A circuit was designed in such a manner that any microphonic pulse exceeding the predetermined tolerable microphonic pulse voltage would be indicated on an oscillograph or by neon flash. This makes it possible to pretest tubes prior to actual installation in the instrument.

6. Survey Instrument Development and Improvement.

(a) The sensitivity of X263 survey meters has always been unsatisfactory for reading of 0.001 and 0.002 R per 24 hours which were important in clearing non-target ships. By the use of three VX 33 tubes in parallel in the V-3 position the sensitivity was increased 10 times. The instrument construction and VX-33 tubes did not turn out to be rugged enough to maintain this order of sensitivity over any considerable period of time so this development was discarded.

(b) To avoid frequent troubles attributed to VX-33 tubes in the X-263 a circuit was designed and tested to use the two triode sections in one 3A5 tube. The grid bias cut off was normally too high in the 3A5 but by selections some lower cut offs were found and a satisfactory modified X-263 tested. With the filaments in series the "A" battery current drain was only 3 times as great as the three VX-33 tubes. Since in this circuit one dual standard tube takes the place of three special tubes, we feel this project deserves continuence.

(c) The installation of a variable trimmer condenser in the C-3 range of the X-263 greatly increases the ease and speed of calibration by avoiding the use of twisted wire pairs. The latter do not seem to remain as constant in capacity as the variable trimmer.

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B. Current Activities:

1. Status of gas mask experiments.

(a) Preliminary tests have been completed on the effectiveness of several types of gas mask canisters and industrial filters in removing air born fission products found on Bikini target ships. While the number of experiments was limited the results of the analysis which were made at the Crocker Radiation Laboratory indicated that all canisters of the types tested and the industrial metal fume filter could be substituted for the R.B.A. if used under conditions of normal dust in target ship compartments. Under extremely dusty conditions the canisters and industrial filter were likewise safely protective because of the small number of tests it was apparent that a greater number of experiments should be performed.

(b) A second series of experiments were conducted using a larger number of canisters with conditions rigidly controlled as follows:

1. Better filter paper of known characteristics.
2. Tandem tests to prove efficiency of filter paper.
3. The use of positive action piston type suction pumps of known air displacement.
4. All air lines, filter holders and hose connections were positively checked against leaks.
5. Mask and mask valves were tested for valve leaks under simulated inhalation conditions.

Analysis of this series of experiments is now under way at the Radiation Laboratory at Hunter's Point and is about 25% complete. All indications are that the results of the preliminary experiments on gas masks will be confirmed.

2. Monitoring of Target Ships:

(a) A complete and detailed monitoring survey covering all decks and platform areas of the U.S.S. CRITTENDEN, APA 77 and the U.S.S. GASCONADE, APA 85 has been completed.

(b) A special survey of open deck areas and compartments of special interest is now in progress. This survey will include contours of "hot" spots of special experimental interest as well as compartment bulkhead, overhead and deck area readings. All readings are being recorded on sketches made of the above areas. Along with the sketch appropriate notes are recorded of any special conditions of the compartment. This special survey is about 10% complete.

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(c) In November, 1946, special areas were encircled in green ink on the weather decks of the U.S.S. GASCONADE and U.S.S. CRITIDEN at every ten frames and the positions identified by number. These areas were surveyed for Gamma and Beta plus Gamma at that time. Since these areas are well marked and can be easily found, monthly surveys are being continued in order to obtain data on general weather background decay.

(d) The submarines PARCHE (SS-384) and DENTUDA (SS-335) will undergo experimental decontamination procedures when made available. As preliminary to decontamination both ships are being completely monitored on all above water structures. This survey is now 95% complete.

Conditions regarding monitor's survey instruments.

(a) All monitoring is now being conducted with the high voltage survey meter. While it cannot be denied that these instruments are heavy and awkward in comparison to the X 263, the accuracy of monitoring data has greatly improved.

Two of these instruments are now being tested with a 10 ft. dial cable extending the range of the probe which allows an extended range reading before the instrument has to be moved. This modification requires additional field use before it can be recommended for general use. We are in need of five (5) more X-263 instruments so that operations are not held up for instrument repair and calibration.

(b) All our instruments are now being recalibrated with a primary radium standard borrowed from the Radiological and Decontamination Unit at Treasure Island, San Francisco. We are still waiting for gamma standards for the Radiation Laboratory that were ordered three months ago.

(c) The 1,000 Volt glass geiger tubes have much better characteristics than the 300 Volt type used in the X-263 survey meter. In order to make possible the use of the 1,000 volt tube without a heavy 9 Volt battery in an instrument of the size and approximate weight of the X-263, an electronic high voltage generator circuit was designed and tested. The electronic high voltage generator was powered by a 67.5 "B" battery. The entire instrument was housed in a X-263 case and a three (3) foot probe and 1,000 Volt geiger tube holder added. This instrument was given a two week test by several monitors working on board vessels and proved to be extremely satisfactory. This project will be continued. One further improvement anticipated will be a simple effective voltage regulator for high voltage section.

Laboratory Instruments

(a) Alpha Scaler

An Argonne National Laboratory type 16-4-14 parallel chamber together with a Metallurgical Laboratory Type A has been with extreme difficulty placed in first class operation and used for all alpha counting so far conducted in the laboratory.

This instrument has a low background count of 0.022 per second and is extremely constant. Standard plutonium alpha has been consistently checked to about 0.5%.

(b) Automatic Monitoring of Alpha and Beta scaling instruments.

In counting low activity samples long counts of several minutes or frequently overnight are necessary. By proper connection of a Geiger rate meter and an Esterline-Angus recorder to alpha counters, every pulse or multiples of 2, 4, 8, 16, 32 and 64 can be recorded as individual spikes. By examination of the record, spurious interruption of counting can be detected.

Royce K. Skow.

Royce K. SKOW,
Lt. Comdr. (HS) U.S.N.R.

ENCLOSURE (A)

Progress Report, Radiation Laboratory, for Period Ending 31 March 1947

ADMINISTRATIVE

A. LABORATORY BUILDING SECURITY

1. Controls for admission to the laboratory building have recently been considerably tightened resulting in exclusion from the laboratory of all casual visitors. Personnel visiting the laboratory are excluded from all areas except the front offices unless their duties require access to restricted areas. This change was accomplished by padlocking all exits except the main exit and the assignment of an armed guard for 24 hours of the day to enforce the regulations.

B. SECURITY OF CLASSIFIED INFORMATION

1. Within a few days it is planned to visit the Crocker Laboratory at the University of California to inspect security measures practiced there. Suggestions obtained at the Berkeley Laboratory will be incorporated here; and the measures taken will be outlined in the 1 May progress report.

C. SECURING OF CLASSIFIABLE SAMPLES

1. All the samples from Bikini and from the non-target ships, which previously were stored in Bldg. 113, were transferred to a small shack located on the lawn in front of the building, where they may be under close surveillance of the laboratory.

D. NEED FOR ADMINISTRATIVE ASSISTANT

1. It has become increasingly evident that the Officer-in-Charge and technical director are burdened too much with routine administrative details. To correct this, steps have been taken to obtain a CAF-7 to take over the following jobs; follow-up on equipment and supply orders and on work orders, routing and follow-up on incoming and outgoing mail, preparation of routine outgoing correspondence, etc.

R. G. PRESTON
Officer-in-Charge

ENCLOSURE (B)

Progress Report, Radiation Laboratory, for Period Ending 31 March 1947

TECHNICAL

A. FACILITIES

1. The equipment and physical facilities situation is generally satisfactory. Certain items of equipment are still critical and some basic equipment and supplies on order have not yet been received. Anticipated delivery dates are satisfactory, however, except for the following items; (1) Tracer Laboratory Company autoscalers; (2) Simpson proportional alpha counters; and (3) standard radium sources. Firm delivery dates have not been obtained for these and all are urgently needed.
2. Chemical facilities are now adequate to accomplish plutonium separations as well as normal chemical routine. The bulk of general equipment is on hand and for the most part installed. Some physical alterations in the laboratory spaces are in progress, but largely incomplete. This included such work as installation of additional hood facilities, power outlets and equipment mounting. The greater part of this work concerns preparation of spaces to handle biological and clinical preparations. Progress is satisfactory.
3. Laboratory instruments on hand for determination of activity permit good estimation of alpha radiation and approximate estimation of beta and gamma radiation. One Argonne National Laboratory parallel plate air chamber in conjunction with a Metallurgical Laboratory scaler, is utilized for alpha counts with good results. Consistent checks of 0.5 percent accuracy with a background of 0.022 cps are obtained. Considering normal errors in chemical preparations, overall accuracy of plutonium assay with this instrument should be within 5 percent. The laboratory has a number of scalers for beta and gamma counting which cannot be depended upon for precise work. One serious difficulty is high voltage regulation. G-M tubes used for these determinations have a plateau slope of 0.2 to 0.4 percent per volt so that very little fluctuation can be permitted. Some corrective measures are being undertaken but it is not anticipated that many of these instruments can ever be made wholly adequate.
4. Preparations preliminary to estimation of radiation intensity, energies, et cetera, necessary for assay of fission products and decay determinations are in progress. Involved are determinations of tube characteristics, i.e., voltage plateau, background, correction factors for back and self scattering, and self and mass absorption. Absolute beta standards for the energy range encountered in the study of fission products are being prepared.
5. Survey instruments continue to be unreliable, and have caused frequent delay in monitoring operations. Minor alterations which have been accomplished with X263 and 263 survey meters have improved these instruments but by no means have corrected all defects. Light shielding of G-M tubes effectively eliminates photo-electronic effects; extension of the probe length of the 263 meters does not interfere, it appears, with the operation but greatly facilitates the use of these instruments on detailed monitoring. Use of X263 meters is greatly diminished in favor of the more accurate 263 meters. Need has recently developed for additional meters of the latter type and procurement of five is being requested. Calibration of survey meters must be done frequently and with

accurate standards. Satisfactory radium sources have been obtained on a loan basis recently, and the situation is temporarily satisfactory. It is expected that these standards can be retained until the standards referred to above are received, if there is no further delay.

7. Establishment of a laboratory library is in progress. A number of basic reference works have been received and more are on order, including back copies of periodicals. Procurement of current periodicals has been initiated. One of the larger remaining rooms in the laboratory has been set aside for a library, and furnishings will be obtained in the near future.

8. Supplies and equipment are on order and some have already been received for setting up a small research clinico-pathological laboratory. Preparations have been initiated for housing of experimental animals to be used in initial biological studies. A small rat house is proposed outside but adjoining the laboratory proper and a dog house in a remote and isolated location. Since these facilities are temporary existing structures will be adapted with a minimum of expense. It is expected that approximately 150 rats will be furnished the laboratory by NERI as soon as necessary requirements can be met. It is planned that the dog house will be ready by 1 May, and the rat house within two weeks.

B. PERSONNEL

1. Civilian Technical Personnel now at the laboratory on full time basis are: W. B. Hawes, and J. P. Dyson. R. I. Condit reported for work on a part time basis on 31 March, as a Research Associate in Physics. Dr. Condit will spend a minimum of one day per week at the laboratory until the end of the academic year in June, after which he will be on a full time basis. R. E. Hooper is to report as a Research Assistant in Chemistry on 7 April. E. J. Polents will report as a Research Assistant in Biology on 16 April.

2. A total of 18 candidates for positions in the chemistry section are under consideration. The majority of these candidates are in the probable professional range of P-3 to P-5. Seven of this number appear both qualified and interested and may be classed as likely employees. Negotiations with the remaining are in the preliminary stages. There are two candidates in physics, both at probable P-2 level. Candidates of which prospects are good are D. D. Cubicciotti; E. J. Frederick; E. Gornick; J. E. Howell; W. W. Miller; C. A. Reynolds; J. Roth.

3. No vacant billets have been established for technical personnel in the P-3 and P-4 grades. Positions at these levels in chemistry and physics will be needed in the near future. Need has already arisen for an Electronic Engineer; establishment of a billet at the P-3 level is in progress.

C. EXPERIMENTAL WORK

1. An investigation of radioactive contamination of fuel oil from the USS GASCONADE was completed. The results of this investigation have been supplied by preliminary report giving principal data and conclusions. A complete report is being prepared.

2. Preliminary tests were conducted with the cooperation of Crocker Radiation Laboratory on mask protection against inhalation hazards on target vessels. This work was reported by Crocker Radiation Laboratory. An expansion and continuation of these experiments was instituted. Mask and canisters in current use by the Navy and the Army are being tested. These experiments are being conducted under more representative and controllable conditions. One complete series of tests has been carried out and the radiation assays for this series are now in progress. Assays are approximately 25 percent completed. This work is being continued with duplicate experiments for confirmation of results.

3. A complete monitoring covering all decks and platform areas of the USS CRITTENDEN and the USS GASCONADE has been completed. In order to exhaust this type of information available from target ships and to develop a standard for similar examinations of other target ships further detailed surveys are being made. This survey includes establishing areas of uniform radiation and contour mapping of non-uniform areas. Data is being obtained on all areas of special interest such as deck and bulkhead and overheads, in order to later analyze and reduce if possible survey readings to terms of actual contamination. This work is about 10 percent completed.

4. In November 1946 special areas at 10 frame intervals were designated on the USS GASCONADE and CRITTENDEN for decay measurements. Radiation intensity, gamma and gamma plus beta, are being recorded at monthly intervals for a practical estimation of decay and weathering.

5. Preparatory to experimental decontamination of the two submarines, USS PARGHE and USS DENTUDA, a complete survey of radiation intensities is being conducted. The survey is 50 percent completed.

6. The above detailed monitoring is being carried out with 263 survey meters, insofar as practical. Particular attention has been given to accurate calibration in order that results may be as precise as possible.

D. AUXILIARY MEDICAL WORK

1. The auxiliary medical work of the laboratory is proceeding satisfactorily. The Shipyard Safety program has been firmly set. Examinations, decontamination procedures, and other established safety measures for personnel working aboard target vessels are being carried out. Medical history sheets and laboratory data are being transcribed to specified forms and will be forwarded to the Bureau of Medicine and Surgery.

2. A two weeks course in Photographic Dosimetry was held for four CPMS and two PMM1. This course was completed 21 March. Instructions and indoctrination of medical officers ordered to the laboratory for temporary duty has and is being given.

N. W. HAWES
Acting Technical Director